GUIDANCE DOCUMENT

WATER SUPPLY CAPACITY MANAGEMENT PLANS

MARYLAND DEPARTMENT OF THE ENVIRONMENT

2006

ROBERT L. EHRLICH, JR.
GOVERNOR

MICHAEL S. STEELE
LIEUTENANT GOVERNOR

KENDL P. PHILBRICK
SECRETARY

JONAS A. JACOBSON
DEPUTY SECRETARY

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This *Guidance Document for Water Supply Capacity Management Plans* (including the Capacity Management Plan Worksheets) is available at MDE's web site under the heading of "More Publications"

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WATER SUPPLY
CAPACITY MANAGEMENT PLANS

2006 GUIDANCE DOCUMENT

I. PURPOSE OF THIS GUIDANCE DOCUMENT

The purpose of this Guidance Document is to assist local governments and other owners of community water supply systems in Maryland in determining the capacity of their water supply systems and in allocating the remaining capacity in a responsible manner. Having an adequate water supply that meets the existing and future water demand in a community is vital for public health protection. Having accurate allocation information, combined with reasonable demand projections, will help ensure that water supply systems achieve a high level of public health protection; operate within Water Appropriation Permit parameters; operate within the limitations of their system to produce safe water; and meet the water supply needs of future residential, commercial, and industrial users in a timely manner.

This Guidance Document is designed to assist local jurisdictions and owners of community water supply systems in developing **Water Supply Capacity Management Plans (WSCMPs)**. This Guide will explain how to calculate available/allocable capacity, how to establish a system to track allocation commitments, and how to report certain information to MDE. The local jurisdiction or owner of the community water supply system will be able to:

- Identify when the demand for water is approaching or exceeding the safe capacity of the water supply system;

- Provide timely and critical information to the Local Health Officer, Environmental Health Director, and elected officials for the approval of subdivision plats and building permits;

- Make commitments for new connections with confidence that there is adequate capacity to serve new as well as existing customers;

- Determine when the approval of subdivision plats and the issuance of additional building permits need to be curtailed until improvements are completed to meet the additional water demand;

- Plan for needed water supply system improvements to ensure continued adequacy of the water system as new growth occurs and as water demand increases; and

- Provide an adequate water supply in order to ensure the protection of public health.

II. SUBMITTAL OF WATER SUPPLY CAPACITY MANAGEMENT PLANS

Each owner of a community water supply system over 20,000 gpd is required to submit a Water Supply Capacity Management Plan (WSCMP) to the Maryland Department of the Environment (MDE) if the water supply system is:

- Operating at 80 percent or more of its Water Appropriation Permit;
- Not meeting the Special Conditions of its Water Appropriation Permit;
- Operating at 80 percent of its contractual limit for purchased water; or
- Subject to a consent order with MDE or the U.S. Environmental Protection Agency / U.S. Department of Justice.

In addition, even if a water supply system is exempt from the requirement to submit a Water Supply Capacity Management Plan, MDE strongly **recommends** that each owner of a community water supply system over 20,000 gpd prepare a Capacity Management Plan. A WSCMP is a useful planning and engineering tool to manage the relationship between the demand for water and the capability of the water supply system to meet that demand. The WSCMP should contain information on water system capacity as it relates to existing and projected demand. Water system connections approved through the land development approval process and the issuance of building permits must be closely tied to available water system capacity.

The expansion of a water supply system requires demonstrated consistency with the local Comprehensive Plan, inclusion in the County Water and Sewerage Plan, possible modification of the Water Appropriation Permit, compliance with the Water Construction Permit, and compliance with the requirements of the Safe Drinking Water Act.

A. Who is Required to Submit a Water Supply Capacity Management Plan?

1) Community water supply systems using under 20,000 gpd (annual average daily demand) are not required to submit WSCMPs to MDE.

2) Although MDE recommends that each community water supply system over 20,000 gpd (annual average daily demand) in Maryland prepare a WSCMP, only certain water supply systems are required to submit a WSCMP to MDE.

   Those community water supply systems over 20,000 gpd required to submit a WSCMP to MDE include:

   a) Any system that is operating at 80% or more of its Water Appropriation Permit (annual average daily permit limitation);

   b) Any system that is not meeting the Special Conditions (such as flow-bys) of its Water Appropriation Permit;

   c) Any system that purchases water and is operating at 80% or more of its contractual limit for the purchased water; or

   d) Any system that is entering into or is operating subject to a Consent Order with MDE or with the U.S. Environmental Protection Agency / U.S. Department of Justice.

3) Notwithstanding items (1) and (2) above, any water supply system that the Secretary of the Department specifically designates is required to submit a WSCMP to MDE.

B. Assistance

WORKSHEETS to assist in the preparation of Water Supply Capacity Management Plans are included in the Appendix of this *Guidance Document*. If you require assistance in completing the WSCMP, please contact the MDE WATER SUPPLY PROGRAM at 410-537-3702.

C. Where to Submit Plans

Mail Water Supply Capacity Management Plans (WSCMPs) to:

Water Supply Program

Water Management Administration, 4th Floor

Maryland Department of the Environment

1800 Washington Blvd.

Baltimore, Maryland 21230-1708

III. LEGAL MANDATE TO MANAGE WATER SUPPLY ALLOCATIONS

It is essential for local governments to carefully manage the allocation of water to new residential, commercial and industrial customers, in conformance with local Comprehensive Plans, County Water and Sewerage Plans, Water Appropriation Permits, and the requirements of the Annotated Code of Maryland pertaining to building permits and subdivision plats. Local governments must ensure that the water supply will be adequate to meet the demand of existing and new users and must allocate any available water in accordance with State as well as local requirements.

The Environment Article of the Annotated Code of Maryland sets forth the State requirements for insuring the adequacy of the water supply to serve new development as well as the authority of the Secretary of the Department to require Water Supply Capacity Management Plans:

§ 9-512 (b) Building Permits – Conformity with county plan; issuance of building permits. –

(1) A State or local authority may not issue a building permit unless:

(i) The water supply system, sewerage system, or solid waste acceptance facility is adequate to serve the proposed construction, taking into account all existing and approved developments in the service area;

(ii) Any water supply system, sewerage system, or solid waste acceptance facility described in the application will not overload any present facility for conveying, pumping, storing, or treating water, sewage, or solid waste; ...

§ 9-512 (d) Subdivision plats – Conformity with county plan; recording or approving subdivision plats. –

(1) A State or local authority may not record or approve a subdivision plat unless any approved facility for conveying, pumping, storing, or treating water, sewage or solid waste to serve the proposed development would be:

(i) Completed in time to serve the proposed development; and

(ii) Adequate to serve the proposed development, once completed, without overloading any water supply system, sewerage system, or solid waste acceptance facility.

(2) Each water supply system, sewerage system, and solid waste acceptance facility in a subdivision shall:

(i) Conform to the applicable county plan; and

(ii) Take into consideration all present and approved subdivision plats and building permits in the service area.

§ 9-205. Submitting plans for existing water supply system, sewerage system, or refuse disposal system for public use.

(a) "Authority" defined. – In this section, "authority" means a water, sewerage, or sanitary district authority.

(b) Application of section. – This section applies only to any water supply system, sewerage system, or refuse disposal system that is for public use in this State.

(c) Required plans, specifications, and reports – In general. – Any authority or person who owns a water supply system, sewerage system, or refuse disposal system or who supplies or is authorized to supply water, sewerage, or refuse disposal service to the public shall submit to the Secretary:

(1) A certified copy of the complete plans for the water supply system, sewerage system, or refuse disposal system that:

(i) Is correct on the date of submission; and

(ii) Is of the scope and detail that the Secretary requires; and

(2) Any existing specifications of or reports on the water supply system, sewerage system, or refuse disposal system.

(d) Same – Exceptions. – If plans do not exist or are of insufficient scope or detail, the authority or person who is required to submit the plans shall:

(1) Prepare and submit to the Secretary new or supplemented plans; and

(2) Make any investigation that is necessary to ensure that the new or supplemented plans are correct.

(e) Additional information. –

(1) The Secretary may request any other information about the water supply system, sewerage system, or refuse disposal system, including information or records on maintenance and operation, that the Secretary considers appropriate.

(2) Any authority or person to whom a request is made under paragraph (1) of this subsection shall submit the information or records to the Secretary.

IV. ELEMENTS OF A WATER SUPPLY CAPACITY MANAGEMENT PLAN

For the purpose of allocating water system capacity, a Water Supply Capacity Management Plan (WSCMP) consists of six major elements:

- **A determination of the existing water demand;**
- **An estimation of the potential additional water demand from approved but undeveloped subdivisions and building permits;**
- **A determination of the water system capacity;**
- **An estimation of the excess water system capacity available for allocation;**
- **A process to track and control the allocation of new connections to the water supply system; and**
- **A process to finance, construct, and operate water supply capital improvements. (This element is not required in WSCMPs at this time, but is optional.)**

The following pages of this Guidance Document address the first five elements of a Water Supply Capacity Management Plan. EPA and MDE have provided guidance for financing, constructing, and operating water supply capital improvements in several other documents. Local governments and water facility owners are not required to address the capital improvement element in their WSCMP at this time. However, at their option, local governments or water facility owners may include descriptions of capital improvements that are planned to remedy the capacity limitations of their water supply systems.

A. DETERMINE THE EXISTING WATER DEMAND

In order to determine the existing water demand, the local jurisdiction or owner of the water supply system should review the operational records of the water system for at least the five previous years and determine:

- **The annual average daily demand (the average 24-hour demand for the entire year), accounting for drought conditions**. A rule of thumb is to take the current annual average daily demand and add 10% to account for the extra demand due to drought. However, the actual unrestricted drought demand (that is, demand under drought conditions where no water restrictions have been in place) may be used if the system has not grown or the average daily demand has not increased since the last drought year.

- **For groundwater systems only: The average daily demand during the month of maximum use under drought conditions.**

- The **maximum-day demand**, excluding days of high demand due to extraordinary circumstances, such as fire and major leaks.
  (The demand on the day with the highest 24-hour demand.)

- **Peak-hour demand**, if available.
  (The maximum-hour demand on the maximum day.)

- The **population served** by the water system for each year under consideration.

- The **number of connections** to the water system for each year under consideration.

- The existing **water usage per capita**.

  $$\text{Water usage per capita} = \frac{\text{(Annual average daily demand, including system losses)}}{\text{(Population served)}}$$

- The existing **water usage per connection**.

  $$\text{Water usage per connection} = \frac{\text{(Annual avg. daily demand, including system losses)}}{\text{(Connections served)}}$$

- The water demand attributable to:
  1) Residential use;
  2) Commercial use; and
  3) Industrial use.

B. ESTIMATE THE POTENTIAL ADDITIONAL WATER DEMAND OF APPROVED BUT UNDEVELOPED SUBDIVISIONS AND BUILDING PERMITS

Many jurisdictions have not established a system to track and account for the potential water demand generated by the approval of record plats and building permits. Often, there is a lag in time between the approval of a subdivision plat and the development of that subdivision. These undeveloped subdivisions or building permits might represent a significant water demand. In order to estimate the potential additional water demand of these undeveloped lots and building permits, the local jurisdiction should:

- Count the number or acres of approved but undeveloped lots in the water service area and prepare population projections based on the zoning of those lots.

- Estimate the additional potential residential water demand based on water usage per capita, per connection, or per acre. If better records are not available, use 250 gpd per household to estimate residential water demand.

- Unless better commercial and industrial estimations are available, estimate additional potential commercial and industrial water demand based on fixture counts converted to equivalent dwelling units (EDUs).

- Add the potential additional residential, commercial, and industrial water demand for each time period. The time periods chosen for analysis should be based on the rate of growth in the water service area compared to the reserve capacity of the water system. In some cases, it may be appropriate to project over five-year intervals. In other cases, it may be necessary to project over one-year intervals. In critical cases, it may be necessary to allocate all of the potential demand from these undeveloped subdivisions and building permits prior to approving any new development.

Three examples of public works design manuals that address water demand projections have been listed in Appendix B. An excerpt from the Anne Arundel County Design Manual is also provided as an example of water demand projections by zoning classifications.

C. DETERMINE THE CAPACITY OF THE WATER SUPPLY SYSTEM (Determine the Most Limiting Factor)

In order to determine the capacity of the existing water supply system, the local jurisdiction or owner of the water supply system should evaluate the components of the water system during drought to determine which component is the most limiting one. An adequate raw water supply, pumping capacity, and treatment capacity must be available to meet the projected maximum day demand.

The components of the water supply system that should be evaluated include:

- **Resource availability during drought.**

For ground water supplies, determine the water availability during the 1-in-10 year drought or consider using the drought of record.

For surface water supplies, determine the water availability during the drought of record.

Well-Field Capacity

For ground water supplies, determine the well-field capacity for two conditions: with all wells operating and with the best-producing well not in operation. **The total well-field capacity for the water system must be able to meet the average daily demand with the best-producing well not in operation.** If possible, determine the well-field capacity based on hydrologic modeling and actual testing of all wells. Determine the safe yield of the well-field based on long-term monitoring of water levels, withdrawal rates, and recharge rates.

Determining the Capacity of a New Well

1) To determine the capacity of a new well in the Coastal Plain, follow the aquifer test procedures included in the Ground Water Appropriation Permit requirements.

2) To determine the capacity of a new well in fractured rock areas, conduct an initial 72-hour pump test followed by long-term monitoring of the production of the well.

   In fractured rock aquifers, the most common response during pumping tests is a pseudo-equilibrium effect (flattening of the time vs. drawdown curve on a semi-log plot), after the first few minutes or hours of a test. Projections made from that part of the curve have produced estimated yields (on average) nearing twice the actual sustained yields. It is strongly recommended that a qualified hydrogeologist be used to analyze all test data.

   After the well is placed in service, the best way to establish the sustained yield of a well is through a long-term monitoring program. The data that needs to be collected and recorded includes the daily production of the well (total amount of

water produced in one day) and the number of hours that the well is pumped, as well as water levels in the well. Water levels should be collected on a daily basis, if the well discharge is variable, and on a weekly basis, if the well discharge is constant. Water levels should remain above the first major water-bearing zone in the well. A minimum monitoring period of three years is recommended, including a dry year, to ensure that groundwater levels have stabilized to the changes caused by pumping of the well. Monitoring beyond that point is also recommended in order to identify any declines in well yield in a timely manner.

- **Water Appropriation Permit limitations.**

  1) For groundwater sources: Annual average daily limitation and average daily limitation during the month of maximum use.

  2) For surface water sources: Annual average daily limitation and maximum day limitation.

  3) Existing Special Conditions of the Water Appropriation Permit, such as flow-bys.

  4) Consider that permit appropriations may be revised during the renewal of the permit to address either water balance analyses; the safe yield from water bodies and raw water reservoirs; or flow-bys needed for aquatic resource protection and downstream users.

- **Capacity of the water supply facility**. The capacity of the water supply facility should be evaluated by determining the **most limiting factor** of the following:

  1) Treatment capacity;

  2) Pumping capacity;

  3) Distribution system requirements;

  4) Storage;

  5) Power supply;

  6) System losses and transfers; and

  7) Fire flow. (See Appendix A. Although MDE does not require that water supply facilities provide fire flow, it is important that the water system account for fire flows and fire storage.)

- **Capacity of the wastewater system.** The owner of the water supply system should also contact the appropriate wastewater treatment system to determine whether there are capacity limitations in the wastewater system.

D. ESTIMATE THE EXCESS WATER SUPPLY CAPACITY AVAILABLE FOR ALLOCATION, IF ANY

The total water system demand consists of the sum of the existing water demand and the potential additional water demand from approved but undeveloped subdivision lots and building permits. This sum must be compared to the capacity of the water supply system, taking into account the most limiting factor. The difference between the capacity of the water system and the total demand (existing and potential demand) is the amount of excess water capacity that is available to allocate to new growth. For each residential connection, assume 250 gpd unless better records are available. For commercial and industrial connections, utilize fixture counts that have been converted to EDUs.

E. CONTROL THE ALLOCATION OF NEW CONNECTIONS TO THE WATER SUPPLY SYSTEM

Some jurisdictions have enacted Adequate Public Facilities Ordinances (APFOs) that establish a process to ensure that development approvals do not outstrip the available infrastructure in that jurisdiction. These jurisdictions should submit copies of their APFO regulations to MDE as well as copies of their periodic tracking reports concerning the allocation of water supply capacity required by the APFOs.

For those jurisdictions that have not previously enacted an APFO, it is necessary to develop a control and accounting system to manage the allocation of water supply capacity. These jurisdictions should develop and submit descriptions of their allocation systems to MDE for review as well as copies of their periodic tracking reports concerning the allocation of water supply capacity.

It is recommended that all jurisdictions include the following procedures in their allocation systems:

1) Check the adequacy of the water supply several times in the development approval process;

2) Require Public Works Agreements and bonds before final development approval;

3) Require plat restrictions to prevent property transfers until the connections to the water system are provided;

4) Provide an initial allocation of water system capacity for a fixed period of time (e.g. two years) and reclaim the allocation if it is not used in that time period; and

5) For proposed development dependent on a new well in the fractured rock areas of Central and Western Maryland, allocate 50% of the proposed building permits initially and phase the remainder of the building permits as supported by the monitoring of the well. (See page 13 - Determining the Capacity of a New Well)

SUMMARY

Please prepare a Water Supply Capacity Management Plan (WSCMP) for each water supply system that includes the following information, if applicable:

1. Name of the water supply system.
2. County and municipality, if applicable.
3. Population served.
4. Connections.
5. Annual average daily demand, preferably under drought conditions.
6. For ground water systems: The average daily demand during the month of maximum use under drought conditions.
7. Maximum day demand.
8. Peak hour demand, if available.
9. Water usage per capita.
10. Water usage per connection.
11. Water demand attributable to residential, commercial, and industrial uses.
12. Potential additional residential, commercial, and industrial demand from approved but undeveloped lots and building permits.
13. Water resource availability during drought.
14. Water Appropriation Permits for groundwater sources: Annual average daily limits and average daily limits during the month of maximum use.
15. Water Appropriation Permits for surface water sources: Annual average daily limits and maximum day limits.
16. Special conditions of the Water Appropriation Permits.
17. Possible future modifications to the Water Appropriation Permits.
18. For each plant, source capacity.
19. For each plant, treatment capacity.
20. For each plant, pump capacity.
21. Distribution system requirements.
22. Elevated storage of finished water.
23. Reliability of power supply and alternate power supply.
24. Water system losses and transfers, if available.
25. Fire flow and fire storage, if available.
26. Capacity limitations of the wastewater treatment plant, if available.
27. Analysis of water demand, water system capacity, and excess capacity available for allocation.
28. Most recent map available of the existing water service area.
29. Adequate Public Facilities Ordinance (APFO) or description of allocation procedures.
30. Name, address and telephone number of elected official completing the WSCMP.
31. Signature of elected official completing the WSCMP and date of signature.

APPENDICES

APPENDIX A: **REFERENCES FOR FIRE FLOW AND FIRE STORAGE**

Example: Frederick County Water Storage Requirements

Example: Frederick County Fire Hydrant Design Flow Rates

APPENDIX B: **REFERENCES FOR WATER DEMAND PROJECTIONS**

Example: Anne Arundel County - Basis for Residential Water Demand Projections for Undeveloped or Partially Developed Areas by Zoning

APPENDIX C: **WATER SUPPLY CAPACITY MANAGEMENT PLANS - WORKSHEETS AND SUMMARY**

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APPENDIX A: FIRE FLOW AND FIRE STORAGE

For small water systems, the demand for fire flow is a significant component of total water demand and often creates a need for significant water storage. The requirements to provide fire flow are usually established by local building codes. Although MDE does not have oversight of fire flow requirements, it is important to account for that portion of the water demand that is necessary for fire flow.

Examples of manuals for the design of water facilities that address fire flow requirements and a guide for the determination of needed fire flow are provided below. Two excerpts from the Frederick County Design Manual are also provided in order to illustrate the storage requirements for fire flow as well as the required flow rates for fire hydrants. **It is incumbent on local governments and other owners of community water systems to utilize professional engineers in the design and evaluation of their water systems.**

Design Manual, Anne Arundel County Department of Public Works, 2001.
(http://www.aacounty.org/DPW/Engineering/DesignManual.cfm)

Design Manual for Water and Sewer Facilities, Frederick County Division of Utilities and Solid Waste Management, 1994.
(http://www.co.frederick.md.us/WastePlan/engineering.htm)

Howard County Design Manual Volume II: Water and Sewer, Howard County Department of Public Works, 2003.
(http://www.co.ho.md.us/DPW/Engineering_Homepage.htm)

Guide for Determination of Needed Fire Flow, ISO, 2005.
(http://www.isomitigation.com/downloads/ppc3001.pdf)

Recommended Standards for Water Works ("Ten-State Standards"),
Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 2003. (www.hes.org)

EXAMPLE

FREDERICK COUNTY

WATER STORAGE REQUIREMENTS

Population	Required Fire Flow (gpm)	Duration (hours)	Fire Flow Storage (gallons)	Total Storage (gallons)
≤1,000	1,500	4	360,000	432,000
1,500	1,500	5	450,000	540,000
2,000	1,500	6	540,000	648,000
3,000	1,750	7	735,000	882,000
4,000	2,000	8	960,000	1,152,000
5,000	2,250	9	1,215,000	1,458,000
6,000	2,500	10	1,500,000	1,800,000
10,000	3,000	10	1,800,000	2,160,000
13,000	3,500	10	2,100,000	2,520,000
17,000	4,000	10	2,400,000	2,880,000
22,000	4,500	10	2,700,000	3,240,000
27,000	5,000	10	3,000,000	3,600,000
33,000	5,500	10	3,300,000	3,960,000
40,000	6,000	10	3,600,000	4,320,000
55,000	7,000	10	4,200,000	5,040,000
75,000	8,000	10	4,800,000	5,760,000
95,000	9,000	10	5,400,000	6,480,000
120,000	10,000	10	6,000,000	7,200,000
150,000	11,000	10	6,600,000	7,920,000
200,000	12,000	10	7,200,000	8,640,000

Source: Page C-121, Design Manual for Water and Sewer Facilities, Frederick County Division of Utilities and Solid Waste Management, 1994.

MDE Note: This table is an example of typical storage requirements. However, if there is significant fluctuation in water use due to a high proportion of commercial and industrial use, this table might not be appropriate. It is incumbent on local governments and other owners of community water systems to utilize professional engineers in the design and evaluation of their water systems.

EXAMPLE

FREDERICK COUNTY

FIRE HYDRANT DESIGN FLOW RATES

USE	FLOW RATE (gpm)
Residential (one and two-family)	1,000
Residential (multi-family)	1,250
Commercial	1,500
Industrial	1,500
Educational / Institutional	1,500

Notes:

1. Flow rates are to be accommodated with a minimum pressure of 20 psi in the main.
2. Fire flow rates are to be combined with maximum daily rates of flow in the distribution network.
3. The storage tanks in the system shall be considered at their minimum elevation when determining the fire flow residual pressure.
4. These flow rates are to be used in the design of public water mains, whether developer or County funded. The use of a property may require a higher flow rate that is to be accommodated by on-site storage.

Source: Page C-122, Design Manual for Water and Sewer Facilities, Frederick County Division of Utilities and Solid Waste Management, 1994.

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APPENDIX B: WATER DEMAND PROJECTIONS

Examples of manuals for the design of water facilities that address water demand projections are provided below. An excerpt from the Anne Arundel County Design Manual is also provided as an example of water demand projections by zoning classifications. **It is incumbent on local governments and other owners of community water systems to utilize professional engineers in the design and evaluation of their water systems.**

Design Manual, Anne Arundel County Department of Public Works, 2001.
(http://www.aacounty.org/DPW/Engineering/DesignManual.cfm)

Design Manual for Water and Sewer Facilities, Frederick County Division of Utilities and Solid Waste Management, 1994.
(http://www.co.frederick.md.us/WastePlan/engineering.htm)

Howard County Design Manual Volume II: Water and Sewer, Howard County Department of Public Works, 2003.
(http://www.co.ho.md.us/DPW/Engineering_Homepage.htm)

EXAMPLE

BASIS FOR RESIDENTIAL WATER DEMAND PROJECTIONS FOR UNDEVELOPED OR PARTIALLY DEVELOPED AREAS BY ZONING

ZONING	PROJ. POP. PER ACRE	PROJ. DWELLING UNITS PER ACRE	PROJECTED AVG. FLOW PER ACRE @ 100 GPCD	MAX. DAY PEAKING FACTOR	MAX. DAY DEMAND GPD/DU	MAX. HR. PEAKING FACTOR
LOW DENSITY						
RA	0.54	0.14	54	2.7	---	3.8
RLD	0.54	0.16	54	2.7	---	3.8
R1	2.59	0.96	259	2.7	729	3.8
R2	4.71	1.74	471	2.7	731	3.8
MEDIUM DENSITY						
R5	8.96	3.43	896	2.4	627	3.5
R10	18.81	7.50	1881	2.4	602	3.5
HIGH DENSITY						
R15	25.88	12.00	2588	1.9	410	3.3
TC	21.66	12.00	2166	1.9	343	3.3
APT.						
R22	30.68	17.00	3068	1.6	289	3.1
R44	61.37	34.00	6137	1.6	289	3.1

Source: Appendix C of Chapter IX, Design Manual, Anne Arundel County Department of Public Works, 2001.

APPENDIX C: WATER SUPPLY CAPACITY MANAGEMENT PLANS

Worksheets and Summary

These simplified worksheets are included to aid in the capacity evaluation of a small water supply system. If your water supply system has a complex arrangement, please call ***MDE's Water Supply Program at 410-537-3702*** *for assistance in completing the capacity evaluation for your system.*

In order to determine the existing water demand, local governments or owners of water supply systems should review the operational records of their water systems for at least the five previous years. If records are not available, estimation methods that are provided herein may be used.

It is incumbent on local governments and other owners of community water systems to utilize professional engineers and hydrogeologists in the design and evaluation of their water supply systems.

MARYLAND DEPARTMENT OF THE ENVIRONMENT
WATER MANAGEMENT ADMINISTRATION
1800 WASHINGTON BOULEVARD
BALTIMORE, MD 21230

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WORKSHEETS AND SUMMARY

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WATER SUPPLY
CAPACITY MANAGEMENT PLAN
Worksheets and Summary

SYSTEM AND PLAN SUBMITTAL INFORMATION

Name of the water supply system _____

County and municipality, if applicable _____

Population served _____

Number of connections _____

Date of plan submittal to MDE _____

IV. ELEMENTS OF A WATER SUPPLY CAPACITY MANAGEMENT PLAN

Please refer to the appropriate sections of the *Guidance Document for Water Supply Capacity Management Plans,* pages 10 through 15.

NOTE: gpd = gallons per day; gpcd = gallons per capita per day

A. DETERMINE THE EXISTING WATER DEMAND

(See page 11 of the *Guidance Document*)

If better records are not available for items A-3, A-6 and A-8, please use the suggested estimations for these items.

1) Determine the **Annual Average Daily Demand** (gpd) for each of the previous five years.

2005 _____

2004 _____

2003 _____

2002 _____

2001 _____

2) Enter the **greatest Annual Average Daily Demand** (gpd) from A-1. _____ **A-2**

3) **Annual Average Daily Drought Demand** (gpd), or value in A-2 + 10%. _____ **A-3**

4) Determine the **Average Daily Demand (gpd) During the Month of Maximum Use in the previous 5 years**. Also enter the month of maximum use for each year.

Month	
_____	2005 _____
_____	2004 _____
_____	2003 _____
_____	2002 _____
_____	2001 _____

5) Enter the **greatest Average Daily Demand (gpd) During the Month of Maximum Use** from A-4. _____ **A-5**

6) **Avg. Daily - Max. Month Drought Demand (gpd),** or value in A-5 + 10%. _____ **A-6**

7) **Maximum Day Demand** (gpd) for the previous five years _____ **A-7**
and date of Maximum Day Demand. _____

8) **Maximum Day Drought Demand**, or value in A-7 + 10%. _____ **A-8**

9) If available, peak hour demand (gph). _____

10) If available, water usage per capita per day (gpcd). _____

11) If available, water usage per connection (gpd/connection). _____

12) If available, water demand (gpd or %) attributable to uses:

- residential _____
- commercial _____
- industrial _____

13) If available, approximate amount of water (gpd) lost to:

- system losses (leaks) _____
- transfers _____
- meter error _____
- other _____ _____

14) If available, percentage of customers that are metered. _____

B. ESTIMATE THE POTENTIAL WATER DEMAND OF APPROVED BUT UNDEVELOPED SUBDIVISIONS AND BUILDING PERMITS

(See page 12 of the *Guidance Document*)

Estimate the **Annual Average Daily Water Demand** (gpd) for approved but undeveloped lots and building permits; and then calculate the **Average Daily Demand During the Maximum Month** and the **Maximum Day Demand** by using peaking factors.

1) Residential Demand (gpd) _____ **B-1**

If better records are not available, use
(250 gpd per household) x (Number of approved households)
to estimate the residential water demand.

2) Commercial Demand (gpd) _____ **B-2**

3) Industrial Demand (gpd) _____ **B-3**

4) POTENTIAL ADDITIONAL DEMAND (gpd) -
Annual Average Daily Water Demand
for undeveloped lots and building permits.
Add B-1, B-2, and B-3. _____ **B-4**

5) POTENTIAL ADDITIONAL DEMAND (gpd) -
Avg. Daily Demand During the Month of Max. Use
for undeveloped lots and building permits.
Multiply B-4 by (1.3 to 1.5 peaking factor) _____ **B-5**

6) POTENTIAL ADDITIONAL DEMAND (gpd) -
Maximum Day Demand
for undeveloped lots and building permits.
Multiply B-4 by (1.6 to 2.0 peaking factor). _____ **B-6**

7) Total Allocations Granted to Date (gpd)
for undeveloped lots and building permits. _____ **B-7**

8) Projected Future Allocations (gpd)

for undeveloped lots and building permits.

Subtract B-7 from B-4 and enter as B-8. _____ **B-8**

9) Project the allocation schedule for B-8. (or similar phasing schedule)

When do you anticipate that allocations (gpd) will be requested for approved but undeveloped lots and building permits?

Year 1 _____ Year 6 _____

Year 2 _____ Year 7 _____

Year 3 _____ Year 8 _____

Year 4 _____ Year 9 _____

Year 5 _____ Year 10 _____

C. DETERMINE THE CAPACITY OF THE WATER SUPPLY SYSTEM

(See pages 13 and 14 of the *Guidance Document)*

These simplified worksheets are included to aid in the capacity evaluation of a typical small water supply system. If your water supply system has a more complex arrangement, please call the **Water Supply Program at 410-537-3702** for assistance in completing the capacity evaluation.

1) List all Water Appropriation Permits, permit limits (gpd), and indicate if there are Special Conditions.

Permit Number	Well Numbers or Source Name	Annual Average	Avg.Day-Max.Month or Maximum Day	Spec. Conditions YES/NO

2) Water Appropriation Permit Limitations.

For the **groundwater permits** listed above, add the Annual Average Daily permit limits and enter the sum in the space provided; and add the permit limits for the Daily Averages During the Month of Maximum Use and enter the sum in the space provided. For the **surface water permits** listed above, add the Annual Average Daily permit limits and enter the sum in the space provided; and add the Maximum Day permit limits and enter the sum in the space provided.

a.	Ground Water	Sum of Ann. Avg. Daily permit limits (gpd)	_____	**2-a**
b.	Ground Water	Sum of Avg. Daily - Max. Month permit limits	_____	**2-b**
c.	Surface Water	Sum of Ann. Avg. Daily permit limits (gpd)	_____	**2-c**
d.	Surface Water	Sum of Max. Day permit limits (gpd)	_____	**2-d**

3) Do any of the Appropriation Permits include **Special Conditions** that limit the ability of the water system to withdraw the permitted quantities of water? YES NO

If yes, please explain: _____

_____

_____

_____

_____

4) Total permitted Annual Average Daily Appropriations (gpd)

Add 2-a + 2-c above and then reduce the sum if there are any limits required by the Special Conditions. _____ **C-4**

5) Surface water only: Total permitted Max. Day Appropriations (gpd)

Item 2-d reduced by any limits required by the Special Conditions. _____ **C-5**

6) Ground water only: Total permitted Avg. Daily - Max. Month Appropriations (gpd). Item 2-b reduced by any limits required by the Special Conditions. _____ **C-6**

7) Are future modifications to your Appropriation Permits planned or necessary? YES NO

If yes, please explain: _____

_____

_____

8) **Total well-field capacity of the water system during <u>drought</u> -**
Average Daily Demand During the Month of Maximum Use (gpd).
Enter the well-field production for the water system
with the best-producing well not in operation (gpd). _____ **C-8**

9) **Safe-yield of the reservoir system.** _____ **C-9**

10) Enter the total **treatment capacity** of the water plant (gpd). _____ **C-10**

11) Enter the **pump capacity** (lowest value of either the well
pump or high service pump) of the water plant (gpd). _____ **C-11**

12) Enter the **total system storage capacity** in gallons. _____

13) If available, enter the **Fire Flow** (gpm) _____
and duration (hours). _____

14) If available, enter the **storage for Fire Flow** (gallons). _____

15) How were the Fire Flow and storage for Fire Flow determined? What was the date (year)
of the most recent evaluation for Fire Flow and Fire Storage? _____
_____
_____
_____
_____

16) Discuss the frequency of power outages: _____
_____
_____

17) Is there a back-up power source for treatment and pumping? YES NO
If yes, please describe: _____
_____
_____

18) Identify the wastewater treatment system for the service area of the water supply system
and enter its average day capacity (gpd). Is capacity available at this wastewater plant?
_____
_____

D. ESTIMATE THE EXCESS WATER SUPPLY CAPACITY AVAILABLE FOR ALLOCATION

(See page 15 of the *Guidance Document*)

Copy the indicated items from the previous sections/pages.

Average Day Capacity Limitation (gpd) (NOTE: PF = Peaking Factor)

C-4 - Total permitted Annual Avg. Daily Appropriations _____

C-8 - Well-field capacity during drought ÷ (1.3 to 1.5 PF) _____

C-9 - Safe-yield of the reservoir system _____

C-10 - Treatment capacity _____

C-11 - Pump capacity _____

Average Day Capacity Limitation. Of the five factors listed above, enter the most limiting factor (in gpd): _____ **D-1**

Excess Average Day Capacity (gpd)

D-1 - Average Day Capacity Limitation _____ **D-1**

A-3 - Average Day Drought Demand _____ **A-3**

EXCESS AVERAGE DAY CAPACITY

D-1 minus A-3. _____ **D-2**

Avg. Daily - Maximum Month Capacity Limitation (gpd)
(only for ground water systems)

C-6 - Total permitted Avg. Day-Max. Month Appropriations _____

C-8 - Well-field capacity during drought _____

C-10 - Treatment capacity _____

C-11 - Pump capacity _____

Avg. Daily - Max. Month Capacity Limitation. Of the 4 factors listed above, enter the most limiting factor. _____ **D-3**

Excess Avg. Daily - Maximum Month Capacity (gpd)

D-3 - Avg. Daily-Max. Month Capacity Limitation _____ **D-3**

A-6 - Avg. Daily-Max. Month Drought Demand _____ **A-6**

EXCESS AVG. DAILY - MAX. MONTH CAPACITY

D-3 minus A-6. _____ **D-4**

Maximum Day Capacity Limitation (gpd)

C-5 - Total permitted Max. Day Appropriations (only for surface water systems) _____

C-10 - Treatment capacity _____

C-11 - Pump capacity _____

Max. Day Capacity Limitation. Of the three factors listed above, enter the most limiting factor (in gpd): _____ **D-5**

Excess Maximum Day Capacity (gpd)

D-5 - Max. Day Capacity Limitation _____ **D-5**

A-8 - Max. Day Drought Demand _____ **A-8**

EXCESS MAXIMUM DAY CAPACITY

D-5 minus A-8. _____ **D-6**

SUMMARY OF EXCESS CAPACITY (GPD)

(Copy the indicated items from the previous sections/pages.)

D-2 Excess Average Day Capacity _____ **D-2**

D-4 Excess Avg. Daily-Maximum Month Capacity _____ **D-4**

D-6 Excess Maximum Day Capacity _____ **D-6**

SUMMARY OF POTENTIAL ADDITIONAL DEMAND (GPD) FROM APPROVED BUT UNDEVELOPED SUBDIVISIONS AND BUILDING PERMITS

B-4 Potential Annual Average Daily Demand _____ **B-4**

B-5 Potential Avg. Daily Demand During the Max. Month _____ **B-5**

B-6 Potential Maximum Day Demand _____ **B-6**

NET EXCESS CAPACITY AVAILABLE FOR ALLOCATION TO NEW GROWTH

The three net excess values calculated below indicate the **approximate excess capacity (gpd)** available for new growth. If an excess capacity value is a negative number, there is a capacity deficit for that demand category.

NAME OF THE WATER SUPPLY SYSTEM: _____

COUNTY AND MUNICIPALITY, IF APPLICABLE: _____

_____

ANNUAL AVERAGE DAILY CAPACITY

D-2 Excess Average Day Capacity _____ **D-2**

B-4 Potential Annual Avg. Daily Demand _____ **B-4**
(from approved but undevel. subdivisions/permits)

NET EXCESS: (D-2 minus B-4) _____ **gpd**

AVERAGE DAILY CAPACITY DURING THE MAX. MONTH

D-4 Excess Avg. Daily-Max. Month Capacity _____ **D-4**

B-5 Potential Avg. Daily Demand During Max. Month _____ **B-5**
(from approved but undevel. subdivisions/permits)

NET EXCESS: (D-4 minus B-5) _____ **gpd**

MAXIMUM DAY CAPACITY

D-6 Excess Maximum Day Capacity _____ **D-6**

B-6 Potential Maximum Day Demand _____ **B-6**
(from approved but undevel. subdivisions/permits)

NET EXCESS: (D-6 minus B-6) _____ **gpd**

E. CONTROL THE ALLOCATION OF NEW CONNECTIONS TO THE WATER SUPPLY SYSTEM

(See page 15 of the *Guidance Document*)

1) Describe your jurisdiction's Adequate Public Facilities Ordinance (APFO) or comparable statute. (Attach a copy of the AFPO regulations or comparable regulations)

_____

_____

_____

_____

_____

2) Describe your jurisdiction's allocation procedures. (Attach a copy of the procedures)

_____

_____

_____

_____

_____

3) How frequently are periodic allocation tracking reports produced?

_____

_____

_____

_____

4) To whom are these reports distributed?

_____

_____

5) During the plat approval process, which agency (or official) ensures that the water supply system has adequate capacity to serve the proposed development?

_____

_____

6) During the building permit approval process, which agency (or official) ensures that the water supply system has adequate capacity to serve the proposed development?

_____

_____

7) Which agency (or official) controls the allocation of connections to the water supply system?

_____

_____

NAME OF THE WATER SUPPLY SYSTEM: _____

COUNTY AND MUNICIPALITY, IF APPLICABLE: _____

_____

CONTACT INFORMATION

List the name, title, address, phone number, fax number, and email address of the elected official or water supply system owner completing this Capacity Management Plan.

Name: _____

Title: _____

Address: _____

_____

_____

_____

_____

_____

Telephone: _____

Fax: _____

Email: _____

CERTIFICATION

I, _____, hereby certify that to the best of my knowledge, the attached Water Supply Capacity Management Plan for *(provide system name)* _____ is accurate and complete.

Signature: _____

Date: _____

Printed Name: _____

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